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ABSTRACT

The Federal Communications Commission (FCC) has been progressing over the past 5 years toward the institution of Direct Broadcast Satellite Radio (DBS-R) which would institute a new type of radio service. The FCC refers to the service as Satellite DARS (Digital Audio Radio Service), and it would provide reliable, high-fidelity satellite-delivered radio signals, receivable on fixed, mobile, and portable devices anywhere in the United States and its environs. Spectrum for provision of DBS-R services has been allocated, but no rules have yet been set, nor any licenses granted. Four proponents remain among those who submitted proposals during a filing window that closed in 1993. Any proponents awarded spectrum under Gen. Docket 90-357 would become national broadcasters, each beaming 20 or more channels of digital audio to national audiences. Note that another form of DBS radio service, Direct-to-Home (DTH), has also begun; two DBS television services (DirecTv and Primestar) currently offer multichannel digital audio services as part of their service packages. The four DBS-R proponents are American Mobile Radio Corporation; CD Radio (formerly Satellite CD Radio); Digital Satellite Broadcasting Corporation; and Primosphere Limited Partnership. In response to debates on fiscal soundness of the proposals, the FCC has leaned toward DBS-R proponents, citing the economic obstacles that their proposals face, while also maintaining that the burden of proof is on those who would obstruct the new technology. To protect terrestrial broadcasters, the National Association of Broadcasters (NAB) has presented items for the FCC to consider regarding Docket 90-357: DBS-R should only be offered as a non-commercial, subscription-based service; DBS-R radio should not be given any head start in authorization over terrestrial Digital Audio Broadcasting; there should be no ground-based components for terrestrial repeating allowed; the application window for prospective DBS-R licenses should be reopened so more than the current four applicants can be considered; and DBS-R service providers should be held accountable to the same standards and public service requirements to which U.S. broadcasters have been traditionally subject. Geographic issues include the probability of signal loss the further a listener is from the equator and international spectrum differences. The most prudent approach for public radio in reaction to possible future DBS-R services should be both defensive and offensive. (AEF)

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DBS Radio: Deathstar or Dud?

By Skip Pizzi

Although still several years away from reality, the very possibility of digital radio broadcasting direct to the American public from geosynchronous satellites strikes fear in the heart of every U.S. radio broadcaster. This trepidation has existed since 1990, when such systems were first proposed, and it grows stronger as the eventuality of the new technology approaches.

Tracking the progress of this technology is a bit confusing. It has proceeded along a separate path from the more notorious digital radio **format** wars that have garnered much of the radio industry's attention of late. The variety of acronyms and terms used by different parties to these proceedings have further complicated matters. To keep things as clear as possible, this article will refer to the satellite services as **DBS-R** (Direct Broadcast Satellite Radio) and to the formats and their discussions as **DAB** (Digital Audio Broadcasting).

Keeping Things Straight

Probably the clearest distinction between the two proceedings is that each group seeks a different pot of gold at the end of the same rainbow. DBS-R proponents are primarily interested in providing future **services** (as licensees), while the DAB proponents are primarily concerned with **hardware** (as format-licensors or manufacturers). This is why the DBS-R discussion is taking place at the FCC, whereas DAB is under joint study by the Electronic Industries Association (EIA, the powerful trade organization of the consumer electronics industry) and the National Radio Systems Committee (NRSC, a group comprised of both EIA and NAB members, ostensibly representing radio broadcasters). The prize for DBS-R proponents is assignment of spectrum from the FCC, while the EIA/NRSC proponents seek the industry's (and the FCC's) blessing on a DAB standard transmission format.

It is tempting to try and simplify matters by considering DBS-R proceedings as strictly a satellite issue and DAB as a strictly terrestrial one, but, in fact, some of the proposed DAB formats under study by EIA/NRSC are designed for, or at least applicable to, satellite usage.

The EIA/NRSC have been conducting tests of various proposed DAB formats since April 1994. The laboratory phase of their study was completed in August 1995, and its results have generated significant controversy since. A second, field-testing

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phase will begin soon (in the multipath-plagued San Francisco market, a good worst-case scenario). Final results are expected sometime in 1996, at which time the EIA/NRSC should make a recommendation to the FCC on a standard DAB transmission format. This decision will definitely apply to terrestrial DAB (or T-DAB, as the Europeans have begun to call it), and it may also have some effect on the technical elements of DBS-R proposals. (At least one DBS-R proponent has told the FCC that much of its transmission scheme will be determined by prevailing attitudes in DAB systems at the time of approval.)

Progress on the DAB front will be the subject of a future CPB report. The remainder of this article will focus on DBS-R matters only.

Eyes on the Prize

The FCC has been making slow progress over the past five years toward institution of DBS-R under the heading of Gen. Docket 90-357, which would institute a wholly new type of radio service. The Commission refers to the service as **Satellite DARS** (Digital Audio Radio Service), and it would provide reliable, high-fidelity satellite-delivered radio signals, receivable on fixed, mobile and portable devices anywhere in the U.S. and its environs. The radios for these services would be new digital receivers with small disc or flat-plate antennas a few inches across. The antennas could be hidden in the roofs of cars, the back panels of portable radios, or the headbands of personal receivers. Building penetration may not be strong with these systems, so fixed, home-receiver antennas might require placement in a window or externally.

Spectrum for provision of DBS-R service has now been allocated (2,310 MHz to 2,360 MHz — in the so-called "S-band"), but no rules have yet been set, nor any licenses granted. Four proponents remain among those who submitted proposals during a filing window that closed in 1993. Any proponents awarded spectrum under Docket 90-357 would become national broadcasters, each beaming 20 or more channels of digital audio to national audiences. These proponents and some salient parameters of their systems are shown in the table on page 3.

Note that 50 MHz of spectrum has been set aside for DBS-R by the FCC, which is significantly more than the current 21 MHz (approximately) allocated to broadcast radio at present. Nevertheless, this 50 MHz is a national allocation, so each channel in the band is granted to one licensee and that's it, whereas in local broadcasting the same channel can be reassigned over and over again in different markets. To avoid a monopoly, it is assumed that at least two licensees will be awarded spectrum, therefore no proponent has asked for more than 25 MHz.

Timeframes

Most elements of the proposals are quite well-developed and detailed, but no satellites have yet been built. No proponent is willing to take on this costly enterprise until given a license to operate by the FCC (akin to buying a transmitter and building a transmission site before getting a broadcast-station construction permit). Building and launching a satellite takes a significant period of time, and even though most proponents plan to use existing, "off-the-shelf" satellite vehicles and components, a 3.5 to 4 year ramp-up time is expected between license approval and initiation of service. No FCC action is expected on DBS-R licensing until late 1996 or beyond, meaning that DBS-R services will not begin until the early 2000s at the soonest.

Note that another form of DBS radio service has already begun, however. Two DBS **television** services — DirecTv and Primestar — currently offer multichannel digital audio services as a part of their service packages. This form of delivery is more specifically known as **direct-to-home** (DTH), meaning that it is not receivable on mobile or portable systems. In this respect it is similar to digital cable audio services. (DirecTv's

30-channel audio service is provided by **Music Choice,** formerly **Digital Cable Radio,** while Jones Intercable provides the 12-channel audio service for Primestar.)

How Systems Differ

The four DBS-R proponents are **American Mobile Radio Corporation** (AMRC), **CD Radio** (formerly **Satellite CD Radio,** the original proponent for the service), **Digital Satellite Broadcasting Corporation** (DSBC) and **Primosphere Limited Partnership.** AMRC is primarily funded by AT&T and Hughes, providing it with deep pockets and direct access to satellite technology, along with experience in launching and marketing DBS services. (Hughes is the parent of DirecTv.) All the other proponents are backed by private investors and venture capital (plus some funds raised by initial public offerings), but none are fully financed yet. Significant additional capital would need to be raised (and/or new partnerships formed) before any of these proponents could begin service.

The four proposals also differ in some significant ways:

- All four expect to serve the entire Continental U.S. with a uniform service, but one proposal (DSBC's) includes the ability to add regionally specific "spot beams" of as little as 230 miles in diameter, for separate, localized services. Local broadcasters might provide programming for some of these spot-beam channels.

- Most proposals expect to offer all or some of their services on a subscription basis (implying encrypted signals and addressable receivers), but one (Primosphere) plans a commercially supported, non-encrypted system, operating just like the regular broadcast radio services of today. This proponent has also offered two of its proposed 30 channels to "public radio" (although no official negotiations between any public broadcast entity and the proponent have taken place to date).

- Some proposals include provisions for ground-based repeater systems to strengthen signals in highly populated areas where tall buildings might impede the line-of-sight reception paths from satellites. One proponent (CD Radio) has included the provision to add local terrestrial radio services to these repeaters, allowing local broadcasters in those markets to have access to

DBS-R Proponents

PROPONENT	AUDIO CHAN.	SPECTRUM REQ'D.	TERRESTRIAL COMPONENT	SUPPORT SCHEME[a]	SYSTEM COST
American Mobile Radio	21[b]	15MHz	No	Sub+Adv[c]	$528M
CD Radio	66	25MHz	Yes[d]	Sub[c]	385M
Digital Satellite B'casting	512[e]	25MHz	Yes	Sub+Adv[c]	622M
Primosphere	30[b]	25MHz	No	Adv	373M

NOTES:
a) Each system's business plan describes whether revenues will come from user subscription fees (Sub) or from advertising sales (Adv).
b) Multiple audio fidelity levels offered, from speech-quality mono to CD-quality stereo.
c) Some program channels may be provided by existing broadcasters.
d) Terrestrial repeaters for satellite "gap-filling" also carry multi-channel signals from local broadcasters.
e) Includes national channels plus separate regional channels on spot beams (16 channels per beam).

the ground-based portion of this transmission system for local digital broadcast of their programming.

• Digital audio data compression is used by all systems to gain spectrum efficiency and increase the number of channels that can be provided. Differing amounts of compression are proposed by the various systems, however, with each proponent making a trade-off between channel capacity and audio fidelity. Some proposals include tiered service that would allow different fidelity levels for different program streams (e.g., monaural, mid-fi audio for news/voice channels and stereo, hi-fi audio for music). Varying amounts of non-audio auxiliary data are also proposed.

Economic Models

Some have questioned the fiscal soundness of the DBS-R proposals. Spending $300 to $600 million for a satellite service that will start with no listeners (due to the need for new radios), using a satellite with a 10- to 12-year lifespan (after which it will require replacement for a similarly high reinvestment) seems uncomfortably speculative to these critics. Adding to this ticking chicken-and-egg model is the risky business of satellite launching itself (some systems will require two launches to be fully operational), and the uncertain amount of listener demand and potential customer base, particularly for subscription services.

This had led various pundits to predict that regardless of regulatory action, DBS-R services either will never actually be launched, or will take considerably longer than the 3.5 to 4 year ramp-up time to raise sufficient capital, or will launch but ultimately fail.

Meanwhile, others are far more sanguine about DBS-R's prospects. Among these are many of today's commercial broadcasters, never missing an opportunity to cry out for regulatory relief when any change to their status quo is threatened. Some have also called upon the FCC to auction DBS-R spectrum rather than simply awarding it.

In response, the FCC has leaned toward DBS-R proponents, citing the considerable intrinsic economic obstacles that their proposals face, while also referring to a fundamental FCC tenet that the burden of proof is on those who would obstruct new technology, favoring those who promote it. The FCC sees this as a simple private vs. public interest matter, and is unlikely to accede to broadcasters' protectionist demands. On the other hand, the Commission also has a responsibility to maintain the viability of the broadcast industry that it regulates, in order to preserve the current level of public service that it provides.

The analysis that proponents have cited predicts that a steady base of at least 400,000 subscribers is required for a pay DBS-R service to break even. While this may seem a tall order, consider that cable radio services already claim to have about 500,000 subscribers, and that a potential mobile market of *200 million* vehicles exists in the U.S. Less than one percent penetration of the mobile market along would provide a subscription DBS-R operator with formidable profits.

Meanwhile, narrowcast FM-subcarrier services (primarily foreign language channels) already operate successfully on a local basis in some larger markets, their low-fidelity, cumbersome technology notwithstanding. Given the right combination of programming, hardware, marketing and patient capital, DBS-R could just hit a home-run. If this occurs, its ripple effects could include a drain on terrestrial radio's national advertising revenues (if the DBS-R services were commercially supported) or a decline in public radio station membership contributions (if DBS-R were subscription-based), especially if public radio-style services were offered on pay DBS-R.

For their part, DBS-R proponents have raised several issues that attempt to allay terrestrial broadcasters' fears. First, they postulate that the dissatisfied listener who might turn to a DBS-R service is already lost to the broadcaster, so the measurable rating impact of DBS-R on existing listening patterns will be small. Second, DBS-R services will probably not include local programming, so DBS-R proponents feel that national satellite and local terrestrial services can coexist, sharing listeners by each filling different audience requirements. Along these same lines, they cite that about 80 percent of commercial radio's advertising is locally purchased, so commercial DBS-R would compete only for the 20 percent of radio advertising that comes from national buys. Finally, some DBS-R proponents claim that the mass appeal required for the viability of a local broadcast service is nicely complemented by the more narrowly targeted ("niche") services that a national satellite broadcaster can provide through its audience aggregation.

Reactions from Terrestrial Broadcasters

Nevertheless, terrestrial broadcasters are not amused. In early 1995, the NAB made its feelings known to the FCC regarding Docket 90-357, presenting a number of items for the Commission to consider including in its subsequent rulemaking. Among the NAB's requests were the following:

- DBS-R should only be offered as non-commercial, subscription-based service only, so that it will not compete with terrestrial radio for national advertising dollars.

- DBS-R radio should not be given any head start in authorization over terrestrial DAB.

- There should be no ground-based components for terrestrial repeating allowed.

- The application window for prospective DBS-R licensees should be reopened so more than the current four applicants can be considered.

- DBS-R service providers should be held accountable to the same standards and public service requirements that U.S. broadcasters have traditionally been subject to, and that service to niche audiences should be encouraged.

The FCC has had no official response to these requests to date.

Geographic Issues

The use of geosynchronous satellites for DBS-R requires an equatorial orbit. This means that the further away from the equator a listener travels, the lower on the horizon the satellite gets (the lower the "look angle"). This in turn results in a higher probability of signal loss from line-of-sight blockage by buildings and terrain at the higher latitudes.

The satellite systems that are practical today offer reasonably good performance in this respect in the U.S., allowing small, relatively non-directional antennas to be used for DBS-R. This is not the case in parts of Canada or most of Europe, however. (Remember that Rome is at about the same latitude as Boston, so most of Europe is far further north than the U.S.) This fact coupled with Europe's higher concentration of population and its use of different languages in close proximity makes the continent less attractive for DBS-R applications than the U.S., and the concept has taken a decidedly back-burner status there. (In contrast, terrestrial DAB is strongly on the move in Europe, generally stimulated by numerous state broadcasters' establishment of multichannel Eureka 147 T-DAB systems.)

Spectrum differences are another sticky point. Most European countries are using a variety of VHF-TV band channels for T-DAB, and holding the so-called "worldwide standard" DAB

allocation in the L-band (1,452-1,492MHz) for future DBS-R and possibly terrestrial DAB services. Canada is also using that L-band allocation for terrestrial DAB already, with plans for DBS-R in the same band later. Naturally, this sets up an unfortunate incompatibility with the U.S., where an S-band allocation is to be used for DBS-R, and terrestrial DAB's form remains unclear (although it will certainly not appear in the L-band allocation, which remains reserved in the U.S. for private and governmental aeronautical testing).

Interestingly, the U.S. firm Worldspace (formerly Afrispace) is moving toward launch of its worldwide DBS-R service in **another** portion of the L-band (1470-1530MHz, for which it is licensed even in the U.S.). It is currently building three high-powered satellites, expected to be launched in 1997 and 1998. Each satellite will transmit three separate beams (presumably to be aimed at different countries) with up to 96 audio channels per beam. Motorola is developing the portable **Starman** receiver for the system, using a credit-card sized antenna to receive satellite and terrestrial (SW, AM and FM) signals, and projected to retail for under $100.

Public Radio's Opportunities and Strategies

The most prudent approach for public radio in reaction to possible future DBS-R services is two-pronged, with both defensive and offensive components.

Defensively, public radio should continue to cultivate its local services and ties to its audience. Building listener loyalties today will pay dividends in the future when competition increases. It is unlikely that a national DBS-R broadcaster will be able to provide the particular local service component that a good public radio station offers its audience.

Other elements of this defensive strategy include expansion of local services, both in terms of coverage (through additional transmitters and translators) and programming (through addition of second/third services). Explore and establish a strong on-line presence, as well, with both text/graphics and audio components.

Offensively, consider the opportunities that alliances with DBS-R services might provide. Keep track of market and regulatory movement on this subject, with a particular eye on possibilities for your station's access to new programming outlets. Depending on the system chosen and and its rules, you may have access to local, regional or even national "superstation" channels in the S-band. DBS-R providers may have a strong incentive to include among its offerings the high-quality and niche-oriented programming that public radio produces.

Move toward provision of your station's terrestrial DAB service with all possible speed, as well, if and when a format is established and approved.

Finally, don't take lightly the particular dangers that lurk in DBS-R for public radio's future. If the NAB were to be successful in convincing the FCC to mandate non-commercial/subscription-only operation for DBS-R, that would take the DBS-R operators hand out of the commercial broadcaster's pocket and put it squarely into public radio's. Instead of stealing advertiser dollars, subscription DBS-R would target member dollars instead, and cast DBS-R far more in the likeness of a public radio model than a commercial radio clone.

Taking this scenario a bit further, if DBS-R radios are required to be addressable (for subscription purposes), then customized—and thereby localized—services might also be delivered by a national service provider. Even without addressable receivers, some types of of **pseudo-addressability** could be offered in which a user sets up a profile on his/her radio that filters nationally broadcast data and audio streams into a "custom-assembled" service.

Even if free/commercially supported DBS-R services are offered, the limited number of listener hours in every public radio market may be significantly affected by further audience fragmentation and realignments, and a public radio station's listenership numbers could fall. Add to this the possibility of "leap-frogging" by public radio's national service providers or other "copy-cat" services offered by the DBS-provider that appeal to a public station's listenership.

Unless DBS-R never launches or it fails in the marketplace, the potential for some kind of impact to public radio in the next decade seems unavoidable. In the meantime, public radio broadcasters should work towards minimizing that impact.

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